GPS System 500

General Guide to RoadPlus Editor

Version 4.0
English

Leica Geosystems

Congratulations on your purchase of a new Leica System GPS500.

View of chapters

Contents

Introduction

This manual is an introduction to the application program RoadPlus Editor for the Leica GPS Sytem500. The RoadPlus Editor is for creating and basic editing of special GSI files which are used by the GPS System500 onboard application RoadPlus.
The RoadPlus Editor supports these alignment file types:

- horizontal alignments
- vertical alignments
- cross sections
- cross section assignments
- station equations

It also supports checking horizontal alignments for errors.

RoadPlus Editor is **not** an on board road planning and design application. It is only intended for quick and easy modification of existing alignments, or creation of new ones.

Activation of the Application

The application is activated by an access code which is provided by Leica. If the application does not appear on your menu or you are otherwise unable to access it, please contact your Leica representative.

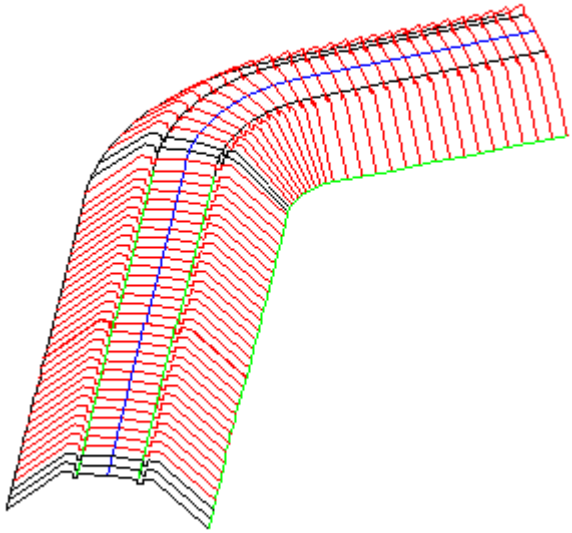
Requirements

You must be familiar with the principles and procedures that are outlined in the “Technical Reference Manual“.
If the material referenced is not thoroughly understood, it is strongly adviced that you review them prior to proceeding with this application program.
Within this manual, it is assumed that you are familiar with the operation of the system.

Design Elements

A road surface can be thought of three different types of design elements:

- the horizontal alignment
- the vertical alignment
- the cross section

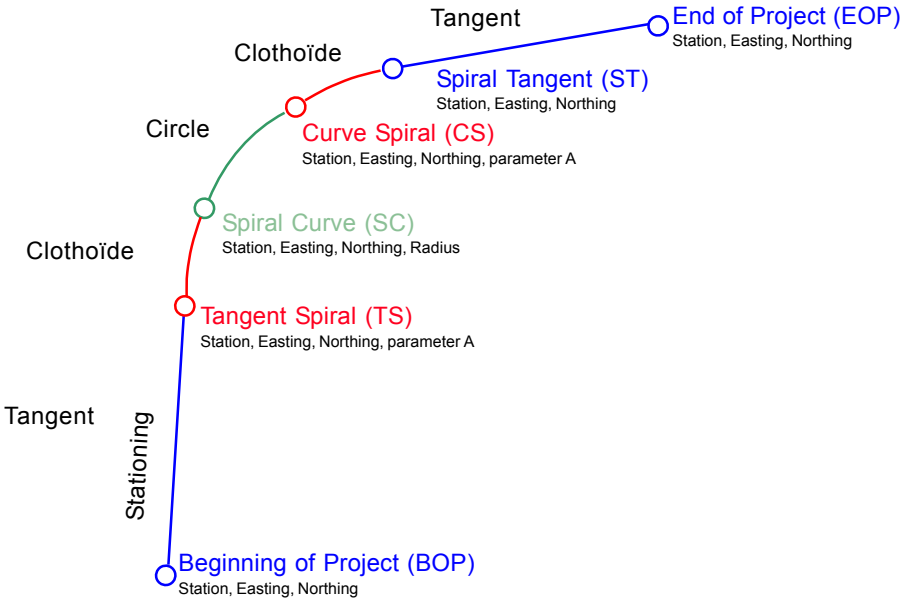


The horizontal alignment defines the road axis of a project.

The **constituting elements** of a horizontal alignment are

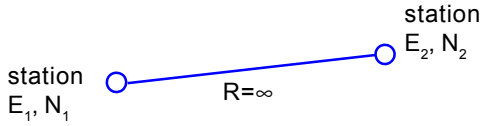
- tangents (straight segments)
- circles
- clothoïdes (spiral in/out, curve in/out).

Each constituting element is defined by individual **horizontal design elements** such as station, easting, northing, radius and parameter A.

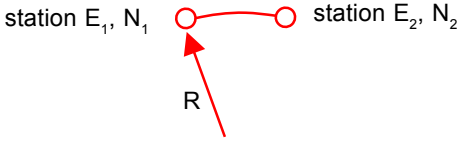


For the reason of completness, a short summary of the design elements for horizontal alignment is included in this chapter.

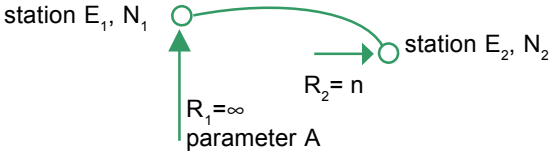
The Tangent - straight line between two points. It's end point is identical with the beginning of a curve or spiral. The tangent is perpendicular to the radius of the curve.



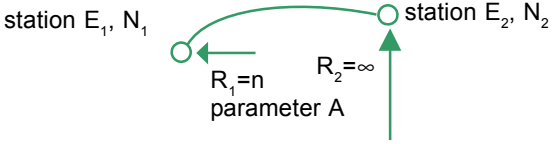
The Curve - circular curve with constant radius.



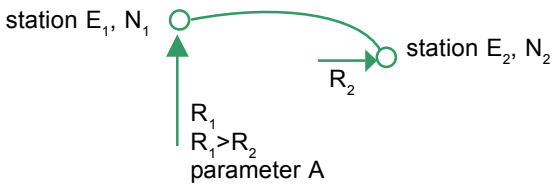
Sipral in - spiral transition from tangent to curve.



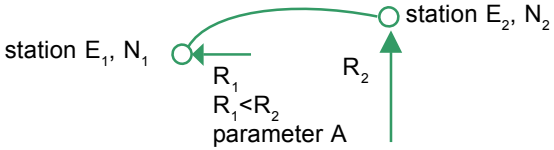
Sipral out - spiral transition from curve to tangent.



Curve in - spiral transition from larger to smaller radius curve.



Curve out - spiral transition from smaller to larger radius curve.



Curve in and out are used for combinations such as:

curve - curve in - curve out - curve
or
tangent - spiral in - curve in - curve

whereas spiral in/out always connect a tangent with a curve / curve in / curve out.

Parameter A

$$A^2 = R \times L$$

R radius of the connecting circular curve
L length of the spiral in/out or curve in/out

Sign convention for curves and spirals:

centre of curvature to left of centre line: R resp. A < 0
centre of curvature to right of centre line: R resp. A > 0

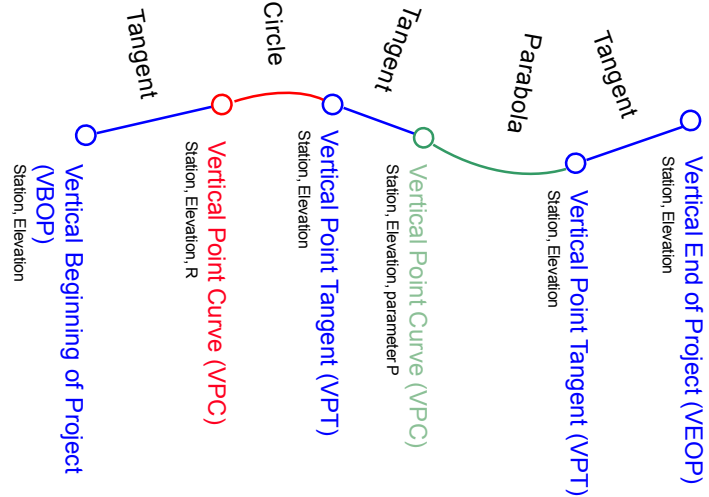
Or in words: Looking in the direction of increasing station, apply the "right hand positive rule".

The vertical alignment gives information about the pattern of heights of the road axis as it is defined in the horizontal alignment.

The **constituting elements** of a vertical alignment are

- tangents (straight segments)
- circles
- parabolas.

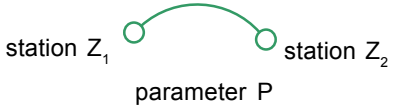
Each constituting element is defined by individual **vertical design elements** such as station, easting, northing, radius and parameter P.



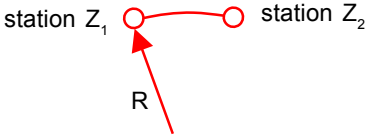
For the reason of completness, a short summary of the design elements for vertical alignment follows.

The Tangent - straight line between two points. It's end point is identical with the beginning of a curve or spiral. The tangent is perpendicular to the radius of the curve.

The Parabola - a parabolic vertical curve with constant rate of grade change.



The Curve - circular vertical curve with constant radius.



Sign convention for curves and parabolas:

centre of curvature below the alignment and curvature over the alignment: R resp. P < 0
centre of curvature above the alignment and curvature under the alignment: R resp. P > 0

Parameter P - is the reciprocal of the rate of change of grade in the vertical curve. Three formulas for the calculation of P exist:

1. $P = L / (G_{out} - G_{in})$

L length as horizontal distance from the beginning to the end of the vertical curve
G_{in} grade of the vertical alignment at the beginning of the vertical curve
G_{out} grade of the vertical alignment at the end of the curve

G_{in} and G_{out} in decimal units (not percent) negative for decreasing elevation with increasing station.

2. $P = (S - S_0)^2 / 2(H - H_0)$

S any station (chainage) on the parabola
S_0 station (chainage) of the high/low point of the parabola
H height at any station S of the parabola
H_0 height of the high / low point of the parabola

3. $P = 1 / 2a$

whereas a is a parameter in the general equation for a parabola in mathematics $Y = aX^2 + bX + c$.

Y elevation of vertical curve above datum
X horizontal distance from the beginning of the vertical curve
a one half of the rate of change of grade in the vertical curve
b Grade of the vertical alignment at the beginning of the vertical curve
c elevation above datum at the beginning of the vertical curve

The Cross Section

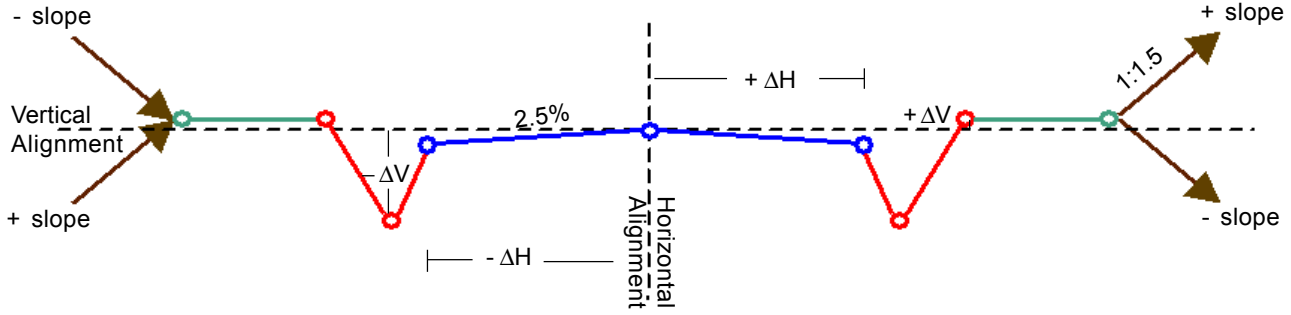
A cross section gives a profile view. It requires vertical alignment or actual elevation on each station.

The **constituting elements** are straight elements. The points are called vertices. You may optionally define slopes at the vertices most left and most right.

Points are definined by:

- ΔH and ΔV
- ΔH and slope in percentage
- ΔH and slope ratio

ΔH horizontal distance from the centre line
ΔV vertical distance from the centre line (vertical alignment or actual elevation mandatory)



Sign convention for cross sections:

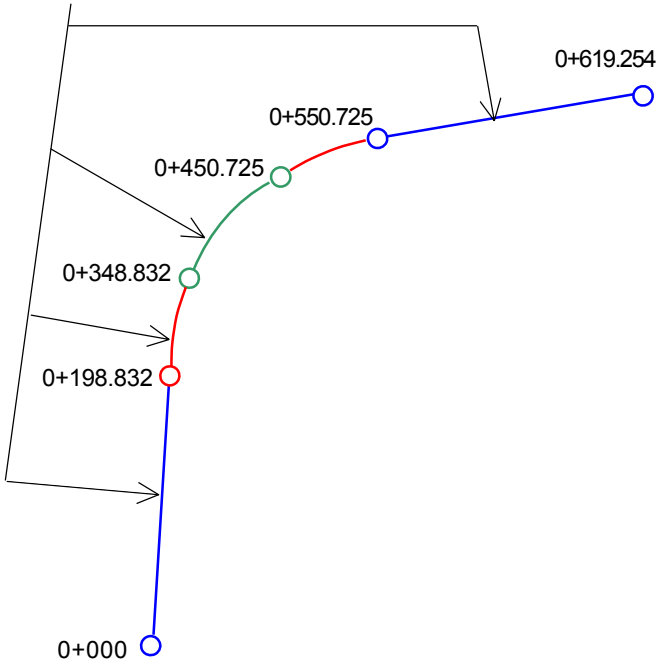
Sign convention is based on horizontal and vertical alignments.
left or below centre line: -
right or above centre line: +

Slope ratio definition:

Percentage is exclusively used as slope ration definition in the RoadPlus Editor.

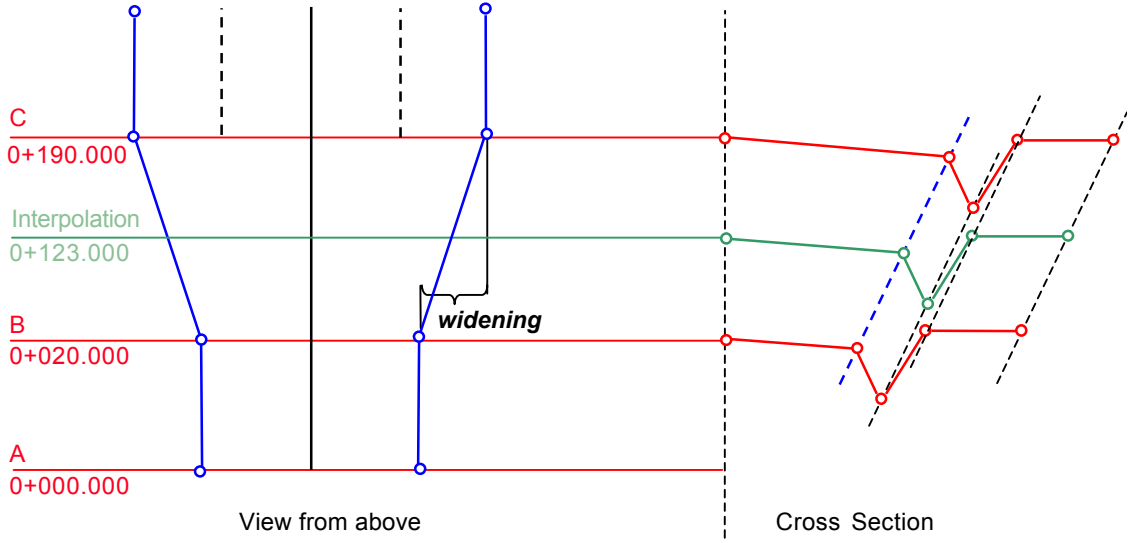
One cross section is valid until a new one is defined at a station ahead.

Cross section definition can be at **any** station. The stations need not necessarily correspond to stations where a design element starts or ends.

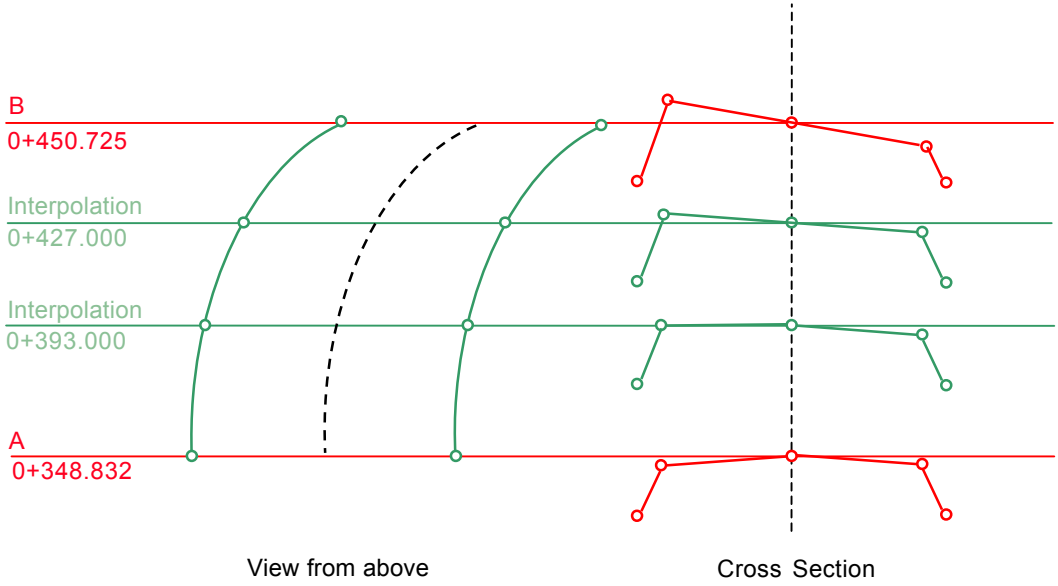


For the reason of completness, widening and superelevation as part of cross sections are mentioned here.

Widening - increase / decrease of road width with change in number of lanes.
Widening influences the shape of the cross sections. RoadPlus has the ability to interpolate cross sections between beginng and end of the widening.



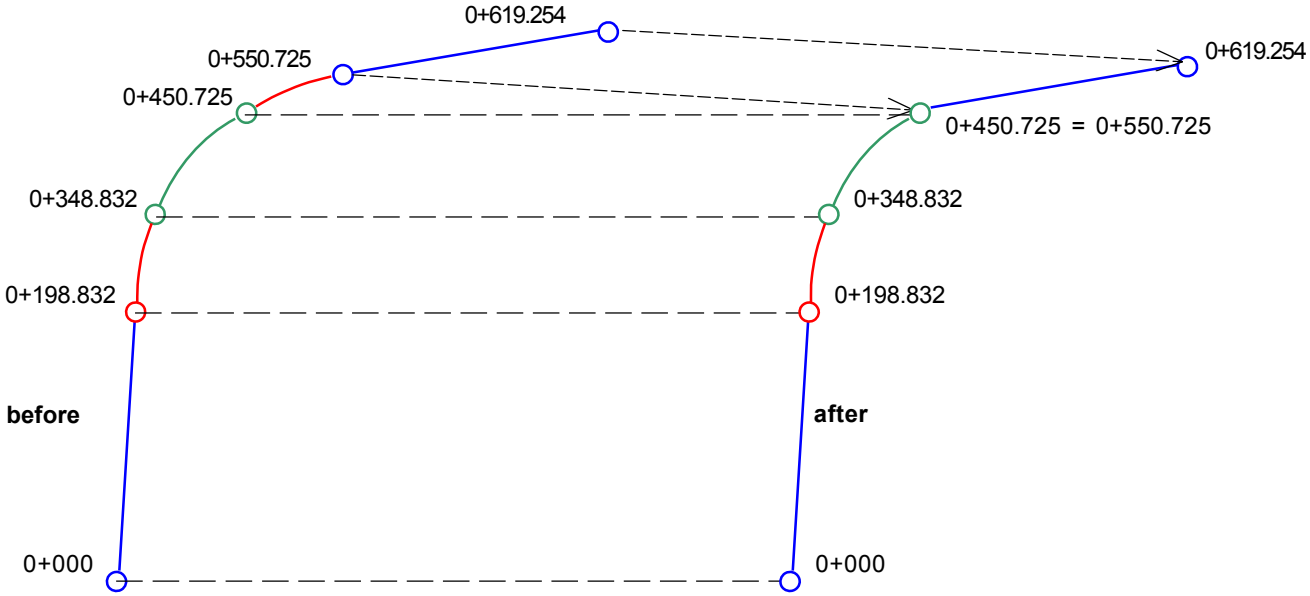
Superelevation - modification of the normal pavement cross slope. Intended to increase comfort and safety at speed.



Station Equations define adjustments for the stationing values in the Horizontal Alignment File. These adjustments may be necessary when the horizontal alignment has been modified by inserting or removing a constituing element and the stationings in the Horizontal Alignment File were not recomputed. This can be the case when editing manually or with a program which does no automatic recomputation. Simply speaking, station equations define leaving a gap or allow an overlap at certain stations.

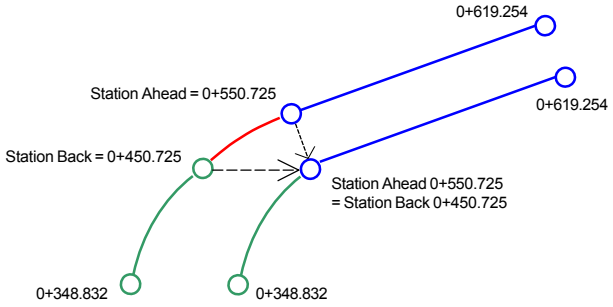
The **constituting elements** in the equations are

- station back
- station ahead.



Due to removing a constituing element, the sequence of stationing misses some values. If this is the case, a **gap equation** (forward station equation) is required. The station equation is of the form:

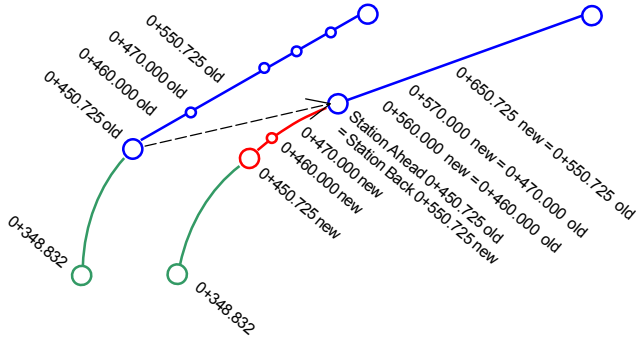
Station Ahead y+yyy = Station Back x+xxx



The stations between 0+450.725 and 0+550.725 will be ignored.

Where the sequence of stationing repeats some values after inserting a design element, we speak of an **overlap equation** (backward station equation). Then, the equation is of the form:

Station Ahead y+yyy = Station Back x+xxx



Stations between 0+450.725 and 0+550.725 exist twice and require re-organizing.

Data Files and Formats

As mentioned in the chapter "Design Elements", a road surface is described by three different design elements - horizontal alignment, vertical alignment and cross section.

The elements of each of these components are kept in individual data files.

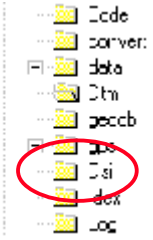
The files are in the Leica GSI file format. The common extension is .gsi. However they are distinguished by three letter file name prefixes which define the file type and must be used when creating the files. The question marks in the example file names may be replaced with any DOS permitted file name character.

Horizontal Alignment File	**ALN?????.GSI**
Vertical Alignment File	**PRF?????.GSI**
Cross Section (Template) File	**CRS?????.GSI**
Cross Section Assignment File	**STA?????.GSI**
Station Equation File	**EQN?????.GSI**

The data files in GSI format can be created either by using the onboard application RoadPlus Editor, the Leica program RoadEd or by converting files from different road packages.

The data files in GSI format created by any of these three meothds can be edited using the onboard application RoadPlus Editor.

New files created with RoadPlus Editor are written to the GSI directory of the PC card or internal memory if available. Files to be edited with RoadPlus Editor must be kept in the same directory.



For creating and editing these files in RoadPlus Editor, a local coordinate system is required since coordinates are displayed as Easting and Northings.

Example for a Horizontal Alignment File in Leica GSI format

All parameters describing the constituting elements of a horizontal alignment build a so called Horizontal Alignment File. The following is an example of a Horizontal Alignment File in Leica GSI8 format. GSI16 is also supported.
A Horizontal Alignment File must contain at least a header and two elements. The last element must be EOP.

```
41....+0EXAMPLE 42....+HZALIGNM 43....+STACOORD
11....+00000000 71....+STRAIGHT 72....+00000NON 73....+QP000125 81..10+06000000 82..10+02000000
11....+00198832 71....+00SPIRIN 72....+00122474 73....+QP000123 81..10+06068005 82..10+02186841
11....+00348832 71....+000CURVE 72....+00100000 73....+QP000123 81..10+06150344 82..10+02307751
11....+00450724 71....+0SPIROUT 72....+00100000 73....+QP000123 81..10+06247816 82..10+02304071
11....+00550725 71....+STRAIGHT 72....+00000NON 73....+QP000125 81..10+06310759 82..10+02227794
11....+00619253 71....+00000EOP 72....+00000NON 73....+00000000 81..10+06345023 82..10+02168447
```

Note that each line must end with a space and that a CR/LF is required after the last data line.

Header of a Horizontal Alignment File in Leica GSI format

The header is the first line in the GSI file. There is only one header line per file.
The header line takes the following form:

41....+0EXAMPLE 42....+HZALIGNM 43....+STACOORD

WI 41	Job identification, maximum 8 ASCII characters, may be defined by user.
WI 42	Identification of Horizontal Alignment File, may not be changed by user. This entry must be +HZALIGNM.
WI 43	Identification of principal point type file, may not be changed by user. This entry must be +STACOORD.

11....+00198832 71....+00SPIRIN 72....+00122474 73....+QP000123 81..10+06068005 82..10+02186841

WI 11	Station (chainage) of principal point. Data units and decimal places are defined by WI 81 and WI 82.
WI 71	Type of the following geometric element.
WI 72	Radius 1 for compound curve resp. A parameter for spirals. If the radius point for a curve is to the right of the alignment (looking in the direction of increasing stations), the radius is positive, otherwise negative. Data units and decimal places are defined by WI 81 and WI 82. Default for tangents and End of Project is 00000NON.
WI 73	Number of cross section assigned to the next geometric element. Corresponds to WI 11 in Cross Section File. A cross section may be assigned to more than one location.
WI 74	Radius 2 for compound curves. If the radius point for a curve is to the right of the alignment (looking in the direction of increasing stations), the radius is positive, otherwise negative. Data units and decimal places are defined by WI 81 and WI 82.
WI 81	Easting of principle point.
WI 82	Northing of principle point.

The following table shows for all possible elements of a horizontal alignment, the variables and predefined names which are required for each WI in a Horizontal Alignment File.

Element	WI 11	WI 71	WI 72	WI 73	WI 74	WI 81	WI 82
Tangent	Station	STRAIGHT	00000NON	Cross Section Number		Easting	Northing
Circular Curve	Station	000CURVE	R	Cross Section Number		Easting	Northing
Spiral - Tangent to Curve	Station	00SPIRIN	A	Cross Section Number		Easting	Northing
Spiral - Curve to Tangent	Station	0SPIROUT	A	Cross Section Number		Easting	Northing
Spiral - Curve to Curve (R1>R2)	Station	0CURVEIN	R1	Cross Section Number	R2	Easting	Northing
Spiral - Curve to Curve (R1<R2)	Station	CURVEOUT	R1	Cross Section Number	R2	Easting	Northing
EOP	Station	00000EOP	00000NON			Easting	Northing

Example for a Vertical Alignment File in Leica GSI format

All parameters describing the constituting elements of a vertical alignment build a so called Vertical Alignment File. The following is an example of such file in Leica GSI8 format. GSI16 is also supported.
An Vertical Alignment File must contain at least a header and two elements. The last element must be EOP.

```
41....+0EXAMPLE 42....+0VALIGNM 43....+STACOORD
11....+00000000 71....+STRAIGHT 72....+00000NON 83..10+00400000
11....+00300000 71....+000CURVE 72....-01142932 83..10+00422500
11....+00500000 71....+STRAIGHT 72....+00000NON 83..10+00420000
11....+00550000 71....+PARABOLA 72....+02091126 83..10+00415000
11....+00850000 71....+STRAIGHT 72....+00000NON 83..10+00406522
11....+01127904 71....+00000EOP 72....+00000NON 83..10+00418605
```

Note that each line must end with a space and that a CR/LF is required after the last data line.

The header is the first line in the GSI file. There is only one header line per file.
The header line takes the following form:

41....+0EXAMPLE 42....+0VALIGNM 43....+STACOORD

WI 41	Job identification, maximum 8 ASCII characters, may be defined by user.
WI 42	Identification of Vertical Alignment File, may not be changed by user. This entry must be +0VALIGNM.
WI 43	Identification of principal point type file, may not be changed by user. This entry must be +STACOORD.

11....+00300000 71....+000CURVE 72....-01142932 83..10+00422500

WI 11	Station (chainage) of a vertical alignment point. The stationing is projected onto a horizontal plane. Data units and decimal places are defined by WI 83.
WI 71	Type of the following geometric element.
WI 72	Radius for following curve or P parameter for parabolas. If the radius point for a curve/parabola lies above the centre line, the radius or P is positive, otherwise negative. Data units and decimal places are defined by WI 83. Default for tangents and End of Project is 00000NON.
WI 83	Elevation of the point.

The following table shows for all possible elements of a vertical alignment, the variables and predefined names which are required for each WI in a Vertical Alignment File.

Element	WI 11	WI 71	WI 72	WI 83
Tangent	Station	STRAIGHT	00000NON	Ordinate
Circular Curve	Station	000CURVE	R	Ordinate
Parabola	Station	0PARABOL	P	Ordinate
EOP	Station	00000EOP	00000NON	Ordinate

Example for a Cross Section File in Leica GSI format

All parameters describing the constituting elements of a cross section build a so called Cross Section (or Template) File. The following is an example of such a file in Leica GSI8 format. GSI16 is also supported.
A Cross Section File must contain at least one cross section. 200 cross sections per file are allowed. One cross section may be described by up to 64 vertices (points).

```
41....+0EXAMPLE 42....+TEMPLATE
11....+QP000123 35..10-00013000 36..10-00003000
11....+QP000123 35..10-00010000 36..10-00005000
11....+QP000123 35..10-00004000 36..10-00000100
11....+QP000123 35..10+00004000 36..10+00000100
11....+QP000123 35..10+00010000 36..10-00006000
11....+QP000123 35..10+00013000 36..10-00003500
11....+QP000124 35..10-00012000 36..10-00002000
11....+QP000124 35..10-00011000 36..10-00004000
11....+QP000124 35..10-00004000 36..10-00000100
11....+QP000124 35..10+00004000 36..10-00000100
11....+QP000124 35..10+00011000 36..10-00005000
11....+QP000124 35..10+00012000 36..10-00002500
11....+TEMPLATE 35..10-00002000 36..10+00000000 71....+0000FILL 72....+00002000
11....+TEMPLATE 35..10-00000500 36..10+00000000 71....+0000FILL 72....+00002000
...
```

Note that each line must end with a space and that a CR/LF is required after the last data line.

The header is the first line in the GSI file. There is only one header line per file.
The header line takes the following form:

41....+0EXAMPLE 42....+TEMPLATE

WI 41	Job identification, maximum 8 ASCII characters, may be defined by user.
WI 42	Identification of Cross Section File, may not be changed by user. This entry must be +TEMPLATE.

```
11....+QP000124   35..10+00012000   36..10-00002500
11....+TEMPLATE   35..10-00002000   36..10+00000000   71....+0000FILL   72....+00002000
```

WI 11	Cross section number, corresponds to WI 73 in the Horizontal Alignment File. Cross section numbers need not be in as- or descending order. However, all data lines having the same cross section number belong together and should be kept together. The data lines for one cross section must be sorted from left to right across the section.
WI 35	Horizontal distance from centre line. A positive distance indicates a point to the right of the centre line. A negative distance indicates a point to the left of the centre line.
WI 36	Height difference from the centre line. A positive height difference indicates a point above the centre line. A negative height difference indicates a point below the centre line.
WI 71	Cross section type; optional.
WI 72	Slope ratio as dH/dV; optional. 0 allowed for all but leftmost and rightmost points in a cross section. Data units defined by WI 35 and WI 36.

The following table shows the two possibilities for defining vertices of a cross section and the predefined names which are required for each WI in a Cross Section File.

Element	WI 11	WI 35	WI 36	WI 71	WI 72
Vertex (using vertical alignment)	Cross Section Number	Horizontal Offset	Vertical Offset	00000CUT 0000FILL	Slope
Vertex (without vertical alignment)	Cross Section Number	Horizontal Offset	Elevation	00000CUT 0000FILL	Slope

Example for a Cross Section Assignment File in Leica GSI format

The Cross Section Assignment File defines the stations for the cross sections. Note that the stations given for the cross sections do not necessarily correspond to stations where design elements start or end. The following is an example of such a file in Leica GSI8 format. GSI16 is also supported.
A Cross Section Assignment File belongs to a corresponding Cross Section File. You must have a Cross Section Assignment File when using a Cross Section File. The number of assignments is restricted to 100 per file. A cross section remains valid until a new cross section is assigned. A given cross section may be assigned more than once. Automatic transitions such as width and superelevation are possible.

```
41....+OEXAMPLE 42....+ASSIGNMT 43....+CRSEXAMP
11....+QP000123 71....+00050000
11....+TEMPLATE 71....+00100000
11....+QP000124 71....+00250553
11....+QP000123 71....+00350000
11....+QP000124 71....+00500000
11....+TEMPLATE 71....+00600000
```

Note that each line must end with a space and that a CR/LF is required after the last data line.

The header is the first line in the GSI file. There is only one header line per file.
The header line takes the following form:

41....+0EXAMPLE 42....+ASSIGNMT 43....+CRSEXAMP

WI 41	Job identification, maximum 8 ASCII characters, may be defined by user.
WI 42	Identification of Cross Section Assignment File, may not be changed by user. This entry must be +ASSIGNMT.
WI 43	Name of the corresponding Cross Section File. The named file must exist in the active directory on the PC card to use an assignment file.

11....+QP000123 71....+00100000

WI 11	Cross section number, corresponds to WI 11 in the Cross Section File and WI 73 in the Horizontal Alignment File.
WI 71	Beginning chainage for the particular cross section.

For the matter of completion, the following table is added as in the previous chapters.

Element	WI 11	WI 71
Assignment	Cross Section Number	Station

Example for a Station Equation File in Leica GSI format

The Station Equation File re-defines horizontal alignments after adding / removing constituing elements. Station Equation Files are optional for RoadPlus and only required when stationings have not been recomputed after changes in the Horizontal Alignment File. The number of equations per file is limited to 64.
The following is an example of such a file in Leica GSI8 format. GSI16 is also supported.

```
41....+0EXAMPLE 42....+0STAEQTN
41....+00000000 42....+00550725 43....+00450725
41....+00000001 42....+00560000 43....+00460000
41....+00000002 42....+00570000 43....+00470000
...
```

Note that each line must end with a space and that a CR/LF is required after the last data line.

If you use the Leica application program RoadPlus Editor for your editing, you really should not need to use a station equation file because it will always attempt to adjust the stationings for you as you make changes. However, RoadPlus Editor does support the creation and editing of these files if they are needed. Be aware of the fact that RoadPlus Editor does not read the station equation file when it checks for errors in your alignment. You can ignore stationing errors which you have corrected using a station equation file.

The header is the first line in the GSI file. There is only one header line per file.
The header line takes the following form:

41....+0EXAMPLE 42....+0STAEQTN

WI 41	Job identification, maximum 8 ASCII characters, may be defined by user.
WI 42	Identification of Station Equation File, may not be changed by user. This entry must be +0STAEQTN.

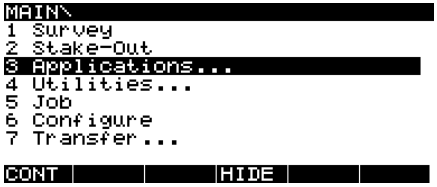
41....+00000000 42....+00550725 43....+00450725

WI 41	Station equation number
WI 42	Station ahead
WI 43	Station back

For the matter of completion, the following table is added as in the previous chapters.

Element	WI 41	WI 42	WI 43
Equation	Station Equation Number	Station Ahead	Station Back

Switch the receiver **ON** > Main Menu
Select **3 Applications ...**
CONT (F1)



Panel APPLICATION \ Menu

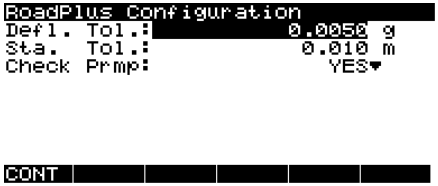
11 RoadPlus Editor

CONT (F1)

Panel RoadPlus Editor

CONF (F2) for defining the RoadPlus Editor parameters.

Panel RoadPlus Configuration



Defl. Tol. - The deflection tolerance is the tolerance value used for determining deflection errors. A deflection error occurs when the beginning curve tangent of an element does not match the ending tangent of the previous element. If the actual error in deflection is greater than this value, the error will be reported.
Sta. Tol. - The stationing tolerance is the tolerance value used for determining stationing errors. A stationing error occurs when the actual stationing value computed by RoadPlus Editor does not equal the value given in the file. If the actual error in stationing is greater than this value, the error will be reported.
Check Prmp - If set to **YES**, each time a new alignment element has been entered, a confirmation message displays the end coordinates for checking.

When all input fields have been set correctly:

CONT (F1)

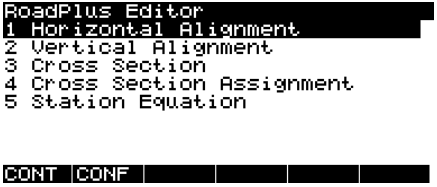
From **panel RoadPlus Editor** the design elements can be accessed.

The Horizontal Alignment component of the application program RoadPlus Editor allows the creation, editing and deleting of the following elements

- Start Point
- Straight (Tangent)
- Curve
- Spiral
- Spiral Curve

as well as checking the horizontal alignment.

Panel RoadPlus Editor



1 Horizontal Alignment

This accesses the **panel MANAGE\ Horiz. Alignment** from where horizontal alignment files can be created, edited, deleted and copied.

CONT (F1) returns to the **panel RoadPlus Editor**.

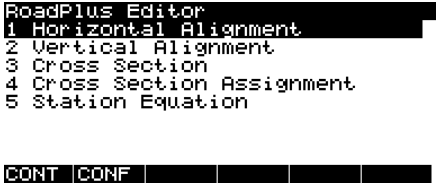
NEW (F2) creates a new horizontal alignment file. See chapter "Creating a Horizontal Alignment".

EDIT (F3) edits the horizontal alignment file. See chapter "Editing a Horizontal Alignment".

DEL (F4) deletes a horizontal alignment file.

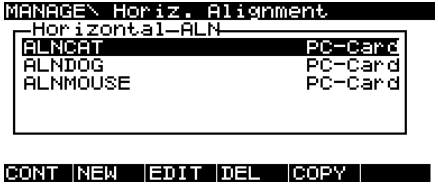
COPY (F5) copies the horizontal alignment file. See chapter "Copying a Horizontal Alignment".

Panel RoadPlus Editor



1 Horizontal Alignment

Panel MANAGE\ Horiz. Alignment



NEW (F2)

Panel HORIZ ALN\ New

Name <ALN> - Enter a 5 digit name. The system automatically adds ALN as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.
Angle Dec. - Set the number of decimals used for the angle.

CONT (F1)

Panel INSERT ELEMENT\ Start Point

Start Stn - Enter the start station for the horizontal alignment.
Start E. - The Easting for the start station.
Start N. - The Northing for the start station.

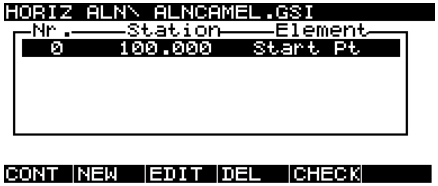
Alternatively, press **GetPt (F2)** when the focus is on the Start E. line or Start N. line to select an existing point from the database.

Highlight the point to be selected.

CONT (F1)

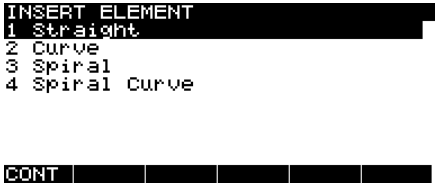
CONT (F1)

Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.



The recently created element of the horizontal alignment is displayed. The list shows the element number, the end station in the units defined for display through the CONFIG key and the type of element. New elements are always inserted after the highlighted element.

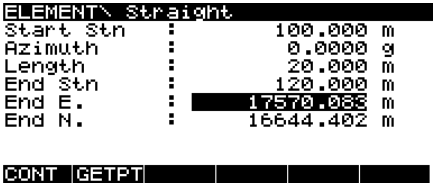
NEW (F2) brings you to the **INSERT ELEMENT** menu.



Select the type of element to be created and press **CONT(F1)**.

Straight

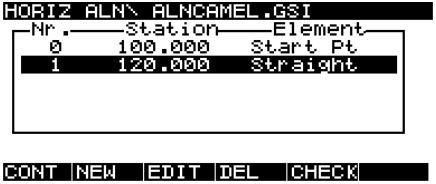
This function enables you to define a straight for the horizontal alignment.



Start Stn - The end station of the previous element is automatically used and cannot be edited.
Azimuth - The azimuth displayed is from the previous element. Another value can be entered manually.
Length - Length of the straight element.
End Stn - Station at the end of the element.
End E. and **End N.** - Enter the Easting and Northing for the end station. Alternatively, press **GetPt (F2)** when the focus is on the End E. End N. line to select an existing point from the database.

When enough design elements are available, then the remaining design elements are calculated. For example: Values for the Start Stn, the Azimuth and the Length have been entered, then the End Stn, the End E. and the End N. are calculated automatically.

CONT (F1)

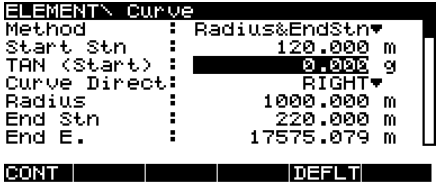


The straight element is added to the list of elements of the horizontal alignment.

Curve

This function enables you to define a curve for the horizontal alignment. A curve can be defined by three methods using different design elements

- Radius&Length, using the radius of the curve and its length
- Radius&EndStn, using the curve's radius and end station
- Radius&DltAng, using the radius and delta angle of the curve.



Method - Select one of the methods **Radius&Length**, **Radius&EndStn**, **Radius&DltAng**.
Start Stn - The end station of the previous element is automatically used and cannot be edited.
TAN <Start> - The azimuth of the tangent in the start point. As default, this is used from the previous element. The value can be edited. To reset the default values after a change press **DEFLT (F5)** when focus is on this line.

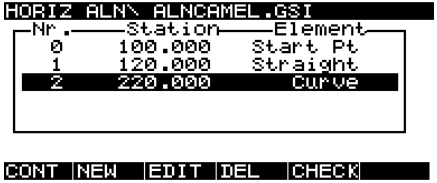
Curve Direct - Looking in the direction of increasing stationing, the direction of the curve can be **RIGHT** or **LEFT**.
Radius - Radius of the curve. The signs are set by the system depending on the curve direction defined in **Curve Direct**.
Curve Length - Only available for method Radius&Length. Length from the start to the end point of the curve.
Delta Angle - Only available for Radius&DltAng. The deflection angle.
End Stn - Only available for Radius&EndStn and Radius&DltAng. The end station of the curve element can be typed in.
End E. and **End N.** - Easting and Northing for the end station are calculated according to the values given and cannot de edited.

When enough design elements are available, then the remaining design elements are calculated.

CONT (F1)

continued ...

Curve continued



The curve element is added to the list of elements of the horizontal alignment.

Spiral

This function enables you to define a spiral for the horizontal alignment. A spiral as the connecting element between a tangent and a curve can be defined by three methods using different design elements

- Radius&Length, using the radius of the connecting curve and its length
- Radius&EndStn, using the radius of the connecting curve and the end station of the spiral
- Param&EndStn, using the parameter A and the end station of the spiral.

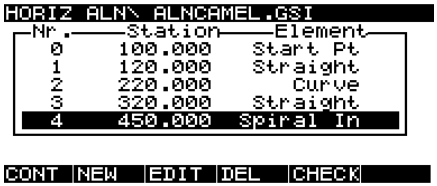
Method - Select one of the methods **Radius&Length**, **Radius&EndStn**, **Param&EndStn**.
Start Stn - The end station of the previous element is automatically used and cannot be edited.
TAN <Start> - The azimuth of the tangent in the start point. This is used from the previous element. The value can be edited. To reset the default values after a change press **DEFLT (F5)** when focus is on this line.
SPRL In/Out - For a spiral transition from tangent to curve select **IN**, for a spiral transition from curve to tangent select **OUT**.
SPRL Direct - Looking in the direction of increasing stationing, the direction of the spiral can be **RIGHT** or **LEFT**.
Radius - Only available for Radius&Length and Radius&EndStn. Radius of the spiral. The signs are set by the system depending on the spiral direction defined in **SPRL Direct**.
Curve Length - Only available for method Radius&Length. Length from the start to the end point of the spiral.
Parameter A - Only available for Param&EndStn. Enter the parameter A defining the spiral.
End Stn - Only available for Radius&EndStn and Param&EndStn. The end station of the curve element can be typed in.
End E. and **End N.** - Easting and Northing for the end station are calculated according to the values given and cannot de edited.

When enough design elements are available, then the remaining design elements are calculated.

continued ...

Spiral continued

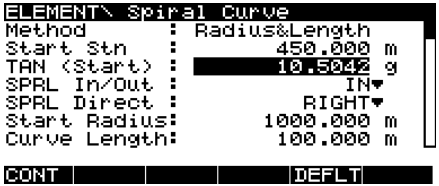
CONT (F1)



The spiral element is added to the list of elements.

Spiral Curve

This function enables you to define a spiral curve for the horizontal alignment. A spiral curve is the transition element from larger to a smaller curve and vice versa and can be defined by the radius of the curve and its length.



Method - **Radius&Length** is predefined and cannot be edited.
Start Stn - The end station of the previous element is automatically used and cannot be edited.
TAN <Start> - The azimuth of the tangent in the start point. This is used from the previous element. The value can be edited. To reset the default values after a change press **DEFLT (F5)** when focus is on this line.
SPRL In/Out - For a spiral transition from a larger to a smaller radius curve select **IN**, for a spiral transition from a smaller to a larger radius curve select **OUT**.
SPRL Direct - Looking in the direction of increasing stationing, the direction of the spiral can be **RIGHT** or **LEFT**.

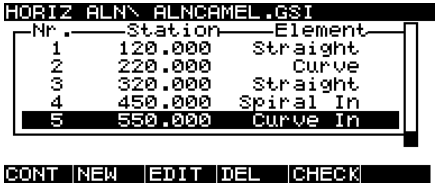
Start Radius - Radius of the starting curve. The signs are set by the system depending on the spiral direction defined in **SPRL Direct**.
Curve Length - Length from the start to the end point of the spiral.
End Radius - The exit radius of the spiral curve. The signs are set by the system depending on the spiral direction defined in **SPRL Direct**.
End E. and **End N.** - Easting and Northing for the end station are calculated according to the values given and cannot de edited.

When enough design elements are available, then the remaining design elements are calculated.

continued ...

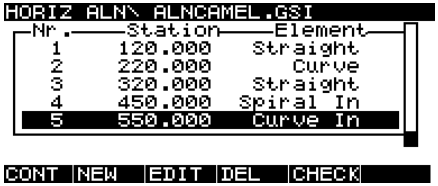
Spiral Curve continued

CONT (F1)



The spiral curve element is added to the list of elements of the horizontal alignment.

From the list of elements of the horizontal alignment, an element can be highlighted and then edited with **EDIT (F3)** or deleted with **DEL (F4)**. Please refer to chapter "Editing a Horizontal Alignment" for more information.



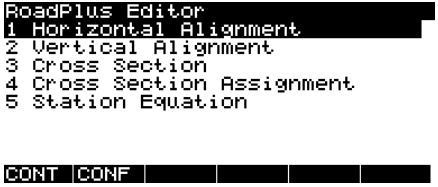
Once all elements are entered correctly check the horizontal alignment.

CHECK (F5)

CONT (F1)

The GSI file for the horizontal alignment is created and stored.

Panel RoadPlus Editor



1 Horizontal Alignment

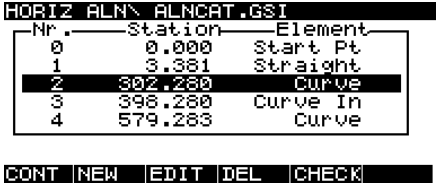
Panel MANAGE\ Horiz. Alignment

Move the focus bar to the horizontal alignment file to be edited.

EDIT (F3)

This leads to **panel HORIZ ALN\ ALN?????.GSI**. From this panel, elements can be edited, inserted and deleted.

Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.

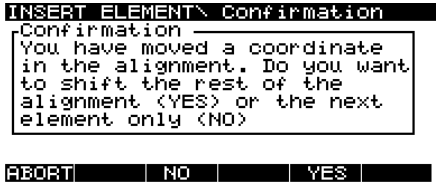


Move the focus bar to the element to be edited.

EDIT (F3)

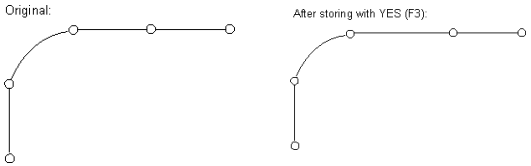
The subsequent input panel depends on the element being edited. For a definition of the input panels please refer to chapter "Creating a Horizontal Alignment". Edit the element as required.

CONT (F1)

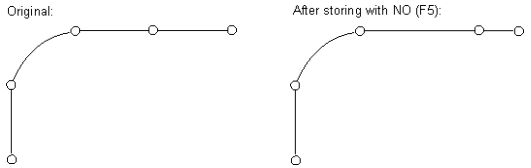


ABORT (F1) does not save the changes.

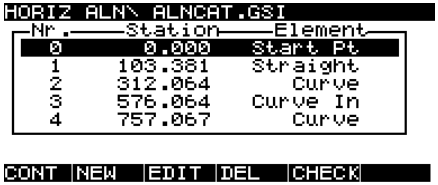
YES (F3) stores the changes and shifts all elements of the alignment by the same amount. The coordinates and stations are updated, all other values are maintained.



NO (F5) stores the changes, recalculates the coordinates of only the following element and updates all stations. The coordinates of all other design elements are maintained.



Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.

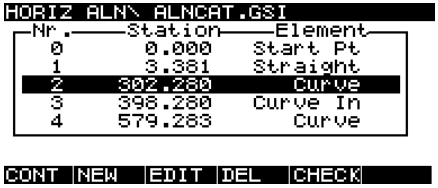


In the list of elements all stations are updated.

CONT (F1)

The GSI file for the horizontal alignment is updated and stored.

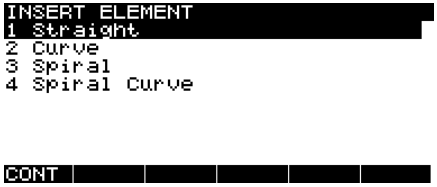
Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.



Elements are always inserted **after** the one highlighted. No element can be inserted before the starting point. Move the focus bar to the desired position.

NEW (F2)

Panel INSERT ELEMENT



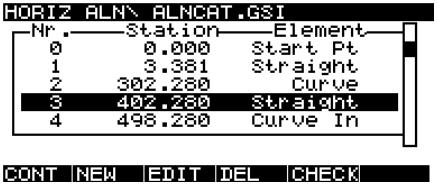
Select the type of element to be inserted.

CONT(F1)

The subsequent input panel depends on the selected element. For a definition of the input panels please refer to chapter "Creating a Horizontal Alignment". Manually make the desired edits.

CONT (F1)

Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.

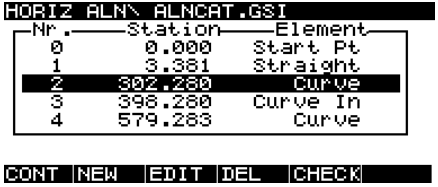


The new element is inserted. The changes are stored and all elements of the alignment are shifted by the same amount. Only the coordinates and stations of all following elements are adapted, the other design elements are maintained.

CONT (F1)

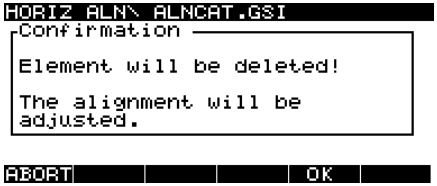
The GSI file for the horizontal alignment is updated and stored.

Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.



Move the focus bar to the element to be deleted. The start point is the only point which cannot be deleted.

DEL (F4)



OK (F5)

The selected element will be deleted. The coordinates and stations of all other elements are updapted. The remaining design elements are maintained.

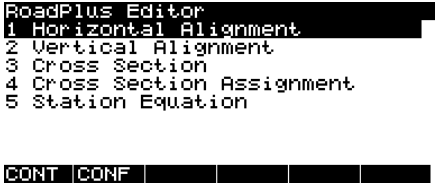
Panel HORIZ ALN\ ALN?????.GSI
where ALN?????.GSI is the horizontal alignment file name.

In the list of elements all stations are updated.

CONT (F1)

The GSI file for the horizontal alignment is updated and stored.

Panel RoadPlus Editor



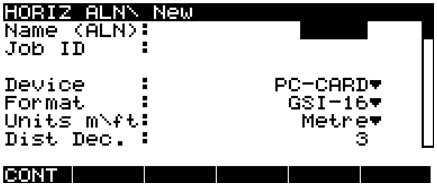
1 Horizontal Alignment

Panel MANAGE\ Horiz. Alignment

COPY (F5)

The properties of the original file are used and may be edited.

Panel HORIZ ALN\ New



Name <ALN> - Enter a 5 digit name. The system automatically adds ALN as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.
Angle Dec. - Set the number of decimals used for the angle.

CONT (F1) copies the file and leaves the current panel.

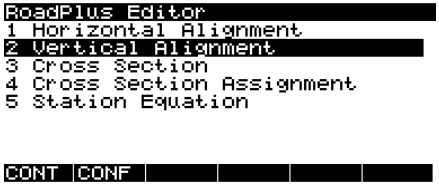
The Vertical Alignment component of the application program RoadPlus Editor allows the creation, editing and deleting of the following elements

- Start Point
- Straight (Tangent)
- Parabola
- Curve.

Throughout the whole Vertical Alignment component, **height and elevation** is used for **local orthometric height**. If no local orthometric height is available, the **local ellipsoidal height** is used instead.

Managing Vertical Alignments

Panel RoadPlus Editor



2 Vertical Alignment

This accesses the **panel MANAGE\Vertical Alignment** from where vertical alignment files can be created, edited, deleted and copied.

CONT (F1) returns to the **panel RoadPlus Editor**.

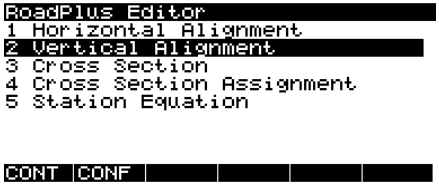
NEW (F2) creates a new vertical alignment. See chapter "Creating a Vertical Alignment".

EDIT (F3) edits a vertical alignment file. See chapter "Editing a Vertical Alignment".

DEL (F4) deletes a vertical alignment file.

COPY (F5) copies a vertical alignment file. See chapter "Copying a Vertical Alignment".

Panel RoadPlus Editor



2 Vertical Alignment

Panel MANAGE\Vertical Alignment

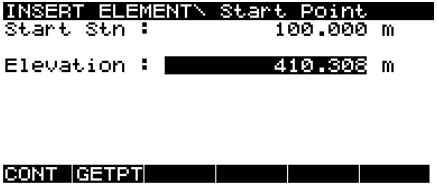
NEW (F2)

Panel VERTICAL ALN\ New

Name <PRF> - Enter a 5 digit name. The system automatically adds PRF as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.
Angle Dec. - Set the number of decimals used for the angle.

CONT (F1)

Panel INSERT ELEMENT\ Start Point



Start Stn - Enter the start station for the vertical alignment.
Elevation - Enter the height for the start station. Alternatively, press **GetPt (F2)** when the focus is on the Elevation line to select the height from an existing point in the database.

Highlight the point to be selected.

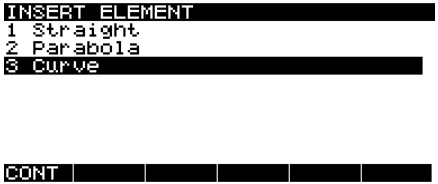
CONT (F1)

CONT (F1)

Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

The recently created element of the vertical alignment is displayed. The list shows the element number, the end station in the units defined for display through the CONFIG key and the type of element. New elements are always inserted after the highlighted element.

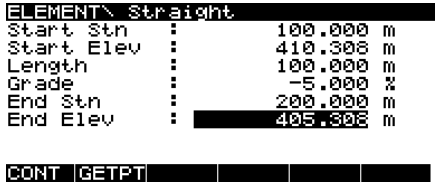
NEW (F2) brings you to the **INSERT ELEMENT** menu.



Select the type of element to be created and press **CONT(F1)**.

Straight

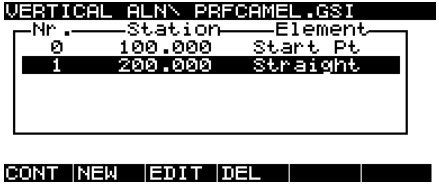
This function enables you to define a straight for the vertical alignment.



Start Stn - The end station of the previous element is automatically used and cannot be edited.
Start Elev - The end height of the previous element is automatically used and cannot be edited.
Length - Length of the straight element as slope distance.
Grade - The grade of the straight element in percentage. Positive inclines have positive values, negative inclines have negative values.
End Stn - Station at the end of the element.
End Elev - Height at the end of the element. Type in manually or, alternatively, press **GetPt (F2)** when the focus is on this line to select the height from an existing point in the database.

When enough design elements are available, then the remaining design elements are calculated. For example: Values for the Start Stn, Start Elev, Length and Grade have been entered, then End Stn and the End Elev are calculated automatically.

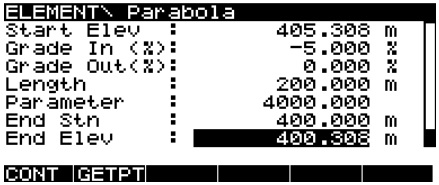
CONT (F1)



The straight element is added to the list of elements of the vertical alignment.

Parabola

This function enables you to define a parabola element for the vertical alignment.



Start Stn - The end station of the previous element is automatically used and cannot be edited.
Start Elev - The end height of the previous element is automatically used and cannot be edited.
Grade In <%> - The grade at the beginning of the parabola in percentage. Positive inclines have positive values, negative inclines have negative values.
Grade Out <%> - The grade at the end of the parabola in percentage. Positive inclines have positive values, negative inclines have negative values.
Length - Length of the parabola as horizontal distance.
Parameter - Parameter of the parabola (for sign conventions see chapter "Design Elements - The Vertical Alignment").

End Stn - Station at the end of the element.
End Elev - Height at the end of the element. Edit the element as required or, alternatively, press **GetPt (F2)** when the focus is on this line to select the height from an existing point in the database.

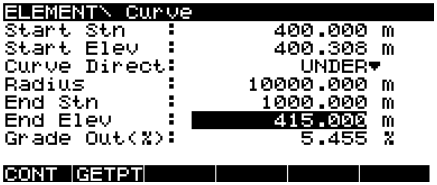
When enough design elements are available, then the remaining design elements are calculated. For example: Values for the Start Stn, Start Elev, Grade In, Grade Out and Length entered, then the Parameter, End Stn and End Elev are calculated automatically.

CONT (F1)

The parabola element is added to the list of elements.

Curve

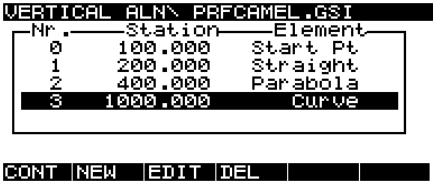
This function enables you to define a curve for the vertical alignment.



Start Stn - The end station of the previous element is automatically used and cannot be edited.
Start Elev - The end height of the previous element is automatically used and cannot be edited.
Curve Direct - Looking in the direction of the vertical alignment, the curvature of the curve can be **OVER** or **UNDER** the alignment (see chapter "Design Elements - The Vertical Alignment").
Radius - Radius of the curve. The signs are set automatically in the GSI file depending on the curve direction defined in **Curve Direct** (for sign conventions see chapter "Design Elements - The Vertical Alignment").
End Stn - Station at the end of the element.

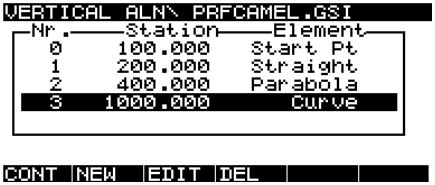
End Elev - Height at the end of the element. Edit the element as required or, alternatively, press **GetPt (F2)** when the focus is on this line to select the height from an existing point in the database.
Grade Out <%> - The grade at the end of the curve in percentage. The calculation of the grade is based on the values for the preceding design elements and cannot be changed.

CONT (F1)



The curve element is added to the list of elements of the vertical alignment.

From the list of elements of the vertical alignment, an element can be highlighted and then edited with **EDIT (F3)** or deleted with **DEL (F4)**. Please refer to chapter "Editing a Vertical Alignment" for more information.



CONT (F1)

The GSI file for the vertical alignment is created and stored.

Panel RoadPlus Editor

2 Vertical Alignment

Panel MANAGE\Vertical Alignment

Move the focus bar to the vertical alignment file to be edited.

EDIT (F3)

This leads to **panel VERTICAL ALN\ PRF?????.GSI**. From this panel, elements can be edited, inserted and deleted.

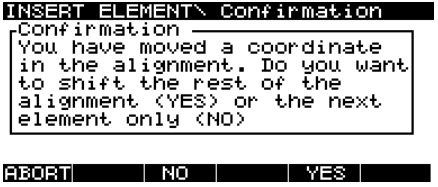
Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

Move the focus bar to the element to be edited. The start point is the only uneditable point of a vertical alignment.

EDIT (F3)

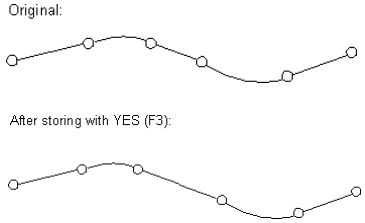
The subsequent input panel depends on the selection. For a definition of the input panels please refer to chapter "Creating a Vertical Alignment". Edit the element as required.

CONT (F1)

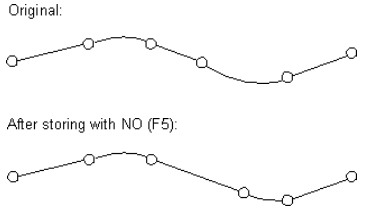


ABORT (F1) does not save the changes.

YES (F3) stores the changes and shifts all elements of the alignment by the same amount. The elevations and stations are updated, all other values are maintained.



NO (F5) stores the changes and recalculates the start station, the start elevation and values of the following element only. The elevations, stations and values of all other design elements are maintained.



Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

In the list of elements all stations are updated.

CONT (F1)

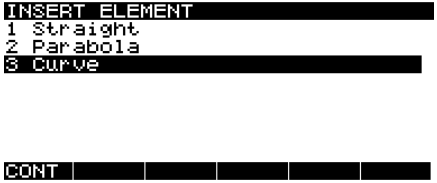
The GSI file for the vertical alignment is updated and stored.

Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

Elements are always inserted **after** the one highlighted. No element can be inserted before the starting point. Move the focus bar to the equivalent position.

NEW (F2)

Panel INSERT ELEMENT



Select the type of element to be inserted.

CONT(F1)

The subsequent input panel depends on the selected element. For a definition of the input panels please refer to chapter "Creating a Vertical Alignment". Edit the element as required.

CONT (F1)

Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

The new element is inserted. The changes are stored and all elements of the alignment are shifted by the same amount. Only the elevations and stations of all following elements are adapted, the other design elements are maintained.

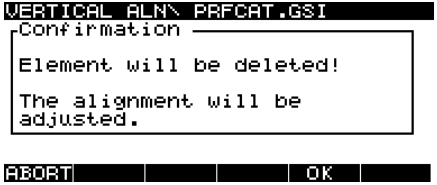
CONT (F1)

The GSI file for the vertical alignment is updated and stored.

Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

Move the focus bar to the element to be deleted. The start point is the only point which cannot be deleted.

DEL (F4)



OK (F5)

The selected element will be deleted. The elevations and stations of all other elements are updapted. The remaining design elements are maintained.

Panel VERTICAL ALN\ PRF?????.GSI
where PRF?????.GSI is the vertical alignment file name.

In the list of the elements all stations are updated.

CONT (F1)

The GSI file for the vertical alignment is updated and stored.

Panel RoadPlus Editor

2 Vertical Alignment

Panel MANAGE\Vertical Alignment

COPY (F5)

The properties of the original file are used and may be edited.

Panel VERTICAL ALN\ New

Name <PRF> - Enter a 5 digit name. The system automatically adds PRF as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.
Angle Dec. - Set the number of decimals used for the angle.

CONT (F1) copies the file and leaves the current panel.

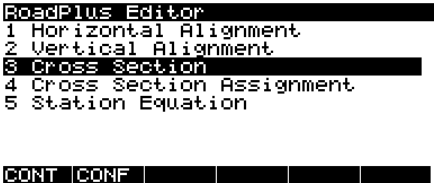
The Cross Section component of the application program RoadPlus Editor allows the creation, editing and deleting of the following elements

- Point
- Straight

of individual cross section templates.

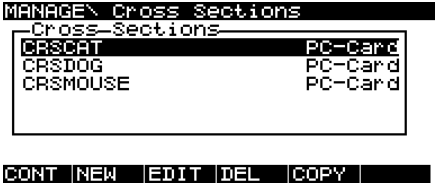
Several cross section templates for one particular RoadPlus Application can be kept together in one cross section file.

Panel RoadPlus Editor



3 Cross Section

This accesses the **panel MANAGE\ Cross Sections** from where cross section files can be created, edited, deleted and copied.



CONT (F1) returns to the **panel RoadPlus Editor**.

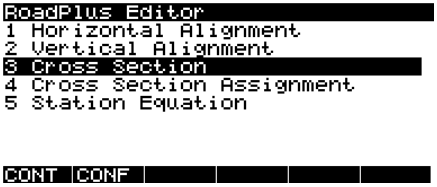
NEW (F2) creates a new cross section file. See chapter "Creating a Cross Section".

EDIT (F3) edits a cross section file. See chapter "Editing a Cross Section".

DEL (F4) deletes a cross section file.

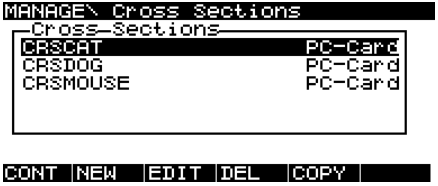
COPY (F5) copies a cross section file. See chapter "Copying a Cross Section".

Panel RoadPlus Editor



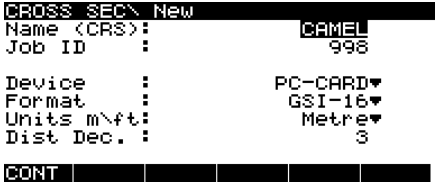
3 Cross Section

Panel MANAGE\ Cross Sections



NEW (F2)

Panel CROSS SEC\ New



Name <CRS> - Enter a 5 digit name. The system automatically adds CRS as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.

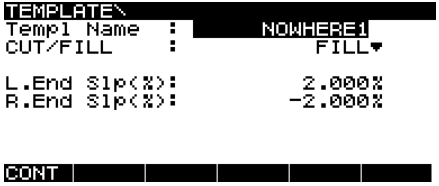
CONT (F1)

Panel CROSS SEC\ CRS?????.GSI
where CRS?????.GSI is the cross section file name.

In this panel, all cross section templates contained in the cross section file are listed. Since no template exists yet, the list is empty.

Press **NEW (F2)** to create a new template.

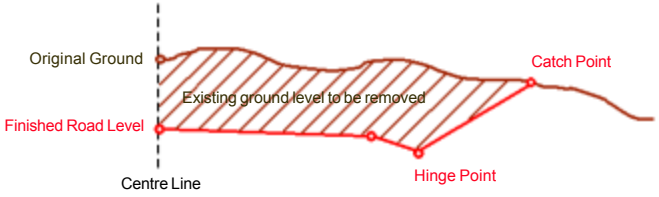
Panel TEMPLATE



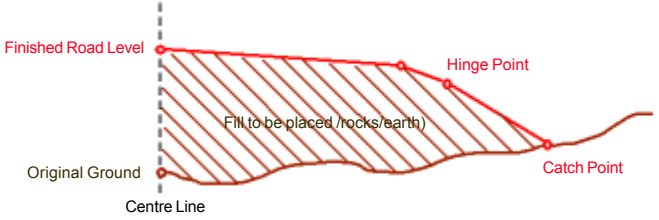
Templ Name - Enter a name for the new cross section template.

CUT/FILL - This is an information field for the user. The information is saved in the GSI file.
Select **NONE** when no extra information is desired.

CUT is a cross section with the hinge point being below the existing surface of the ground.



FILL is a cross section with the hinge point being above the existing surface of the ground.



L.End Slp <%> - A slope at the leftmost point of the cross section can be defined in percent. If the design surface is falling to the left, the slope is a positive value (see chapter "Design Elements").
R.End Slp <%> - A slope at the rightmost point of the cross section can be defined in percent. If the design surface is rising to the right, the slope is a positive value (see chapter "Design Elements").

CONT (F1)

Panel Template\ ???
where ??? is the template name.

In this panel, all segments describing the cross section template are listed. Since no segments exist yet, the list is empty. The units are as defined for display through the CONFIG key.

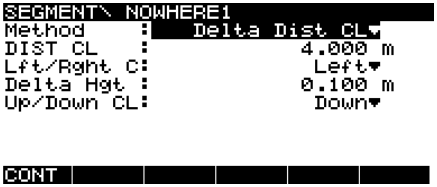
Press **NEW (F2)** to create a segment.

Panel Segment\ ???
where ??? is the template name.

For entering the segment information, select between method **Delta Dist CL** and **Cross Slp<%>**. Depending on the selected method, the input fields change. Both methods are described in the following section.

Delta Dist CL

By this method, a new point is added to the cross section template. The point is defined by its horizontal and vertical distance from the centre line.



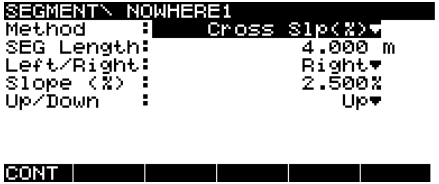
Method - In this case, **Delta Dist CL** is selected.
DIST CL - The horizontal distance from the centre line. Only positive values are accepted. The plus or minus sign in front of this value in the GSI file is determined by the selection field **Lft/Rght C**.
Lft/Rght C - Left is to be selected for a point left from the centre line. Right is to be selected for a point right from the centre line.
Delta Hgt - Here, the vertical height difference between the centre line and the point needs to be entered. Only positive values are accepted. The plus or minus sign in front of this value in the GSI file is determined by the selection field **Up/Down CL**.

Up/Down CL - Up is to be selected for a point above the centre line. Down is to be selected for a point below the centre line.

CONT (F1)

Cross Slp<%>

By this method, a new point is added to the cross section template. The point is defined by a horizontal distance, also called segment length, and a slope from a reference point. Usually, this reference point has been defined before as a point in the cross section template. If the overall first point of a cross section template is defined by this method, the centre line is the reference point.



Method - In this case, **Cross Slp<%>** is selected.
SEG Length - The horizontal length of the segment. Only positive values are accepted. The plus or minus sign in front of this value in the GSI file is determined by the selection field **Left/Right**.
Left/Right - Left is to be selected for a segment at the left end of the cross section. Right is to be selected for a segment at the right end of the cross section.

Slope <%> - The slope of the segment from the end of the previous segment, not from the centre line. Only positive values are accepted. The plus or minus sign in front of this value in the GSI file is determined by the selection field **Up/Down**.
Up/Down - If the new segment goes up from the end of the previous segment, select **Up**. Otherwise select **Down**.

CONT (F1)

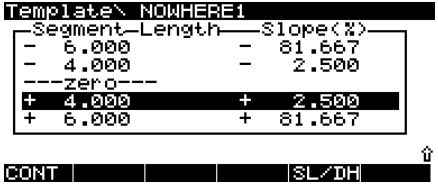
The segment information entered with this method is converted into horizontal and vertical distance from the centre line. It is then stored as method Delta Dist CL.

Panel Template\ ???
where ??? is the template name.

Independant of the method selected, the points are added to a list of segments. The order in the list is from the leftmost point to the centre line to the rightmost point. Any new point is added according to this order.

The list shows the horizontal and vertical centre line offset. For sign conventions see chapter "Design Elements".

SL/DH (F5) changes the display to show segment length and the slope in percent.



SL/DH (F5) to change back to the former display.

There, press **Shift + PLOT (F5)** to see a graphical presentation of the cross section template. **CONT (F1)**.

From the list of segments of the cross section template, an element can be highlighted and then edited with **EDIT (F3)** or deleted with **DEL (F4)**. Please refer to chapter "Editing a Cross Section" for more information.

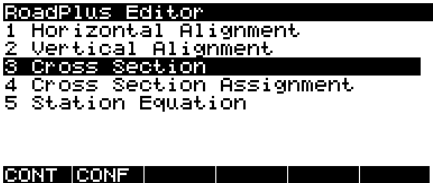
CONT (F1) returns to **panel CROSS SEC\ CRS?????.GSI** where CRS?????.GSI is the cross section file name.

The created cross section template is added to the list.

CONT (F1)

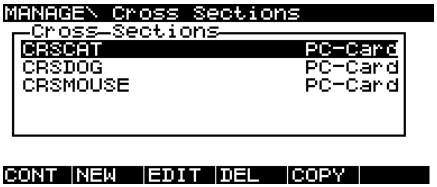
The GSI file for the cross section is created and stored.

Panel RoadPlus Editor



3 Cross Section

Panel MANAGE\ Cross Sections



Move the focus bar to the cross section file to be edited.

EDIT (F3)

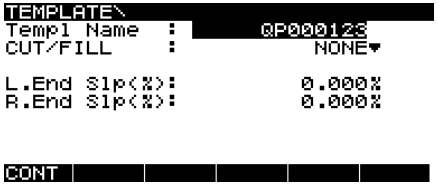
This leads to **panel CROSS SEC\ CRS?????.GSI**, from where all cross section templates contained in the cross section file can be edited, deleted and graphically displayed or a new template can be created.

Panel CROSS SEC\ CRS?????.GSI
where CRS?????.GSI is the cross section file name.

Move the focus bar to the cross section template to be edited.

EDIT (F3)

Panel TEMPLATE



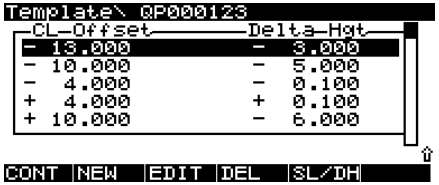
All fields can be edited. For a description of the input fields see "Creating a Cross Section".

CONT (F1)

This leads to **panel Template\ ???**, from where all segments of the cross section file can be edited and deleted or a new segment can be created.

Editing a Segment in an Existing Cross Section Template

Panel Template\ ???
where ??? is the template name.



Move the focus bar to the segment to be edited.

EDIT (F3)

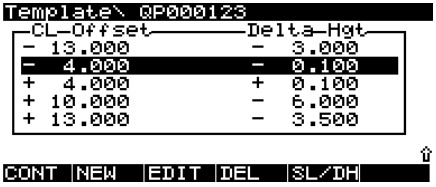
Panel Segment\ ???
where ??? is the template name.

Since all entries previously entered using the Cross Slp<%> method are converted into Delta Dist CL, only method Delta Dist CL is shown and not changable.

Edit the element as required. For a definition of the input fields please refer to chapter "Creating a Cross Section".

CONT (F1)

Panel Template\ ???
where ??? is the template name.



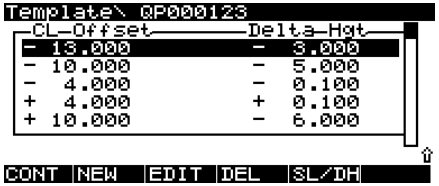
The list of segments of the cross section template is updated.

CONT (F1) leads back to **panel CROSS SEC\ CRS?????.GSI** where CRS?????.GSI is the cross section file name.

To store the changes in the GSI file press **CONT (F1)**.

Inserting a Segment into an Existing Cross Section Template

Panel Template\ ???
where ??? is the template name.



If the new segment information to be entered is to be input as a horizontal and vertical distance from the centre line, the position of the focus bar is irrelevant. The method to be chosen in the next panel is **Delta Dist CL**.

If the new segment information is to be input as horizontal distance (segment length) and slope<%> from an existing segment in the cross section template, the focus bar must be positioned on this segment. The method to be chosen in the next panel is **Cross Slp<%>**.

NEW (F2)

Panel Segment\ ???
where ??? is the template name.

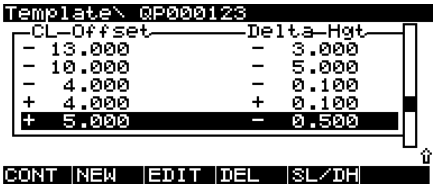
Enter the values for the new segment. For a definition of the input fields please refer to chapter "Creating a Cross Section".

CONT (F1)

continued ...

Inserting a Segment into an Existing Cross Section Template continued

Panel Template\ ???
where ??? is the template name.



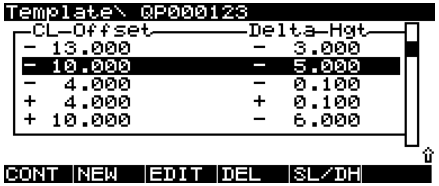
The list of segments of the cross section template is updated.

CONT (F1) leads back to **panel CROSS SEC\ CRS?????.GSI** where CRS?????.GSI is the cross section file name.

To store the changes in the GSI file press **CONT (F1)**.

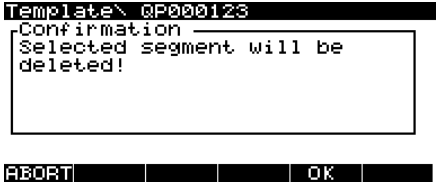
Deleting a Segment in an Existing Cross Section Template

Panel Template\ ???
where ??? is the template name.



Move the focus bar to the segment to be deleted.

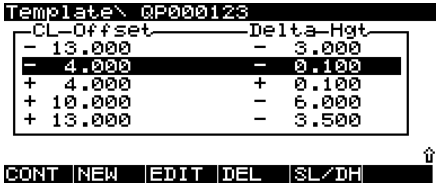
DEL (F4)



OK (F5)

The selected segment will be deleted.

Panel Template\ ???
where ??? is the template name.



The list of segments of the cross section template is updated. The values for CL Offset and Delta Hgt are maintained. The values for Segment Length and Slope<%> which can be viewed with **SL/DH (F5)**, are recomputed and updated accordingly.

CONT (F1) leads back to **panel CROSS SEC\ CRS?????.GSI** where CRS?????.GSI is the cross section file name.

To store the changes in the GSI file press **CONT (F1)**.

Inserting a New Cross Section Template

Panel CROSS SEC\ CRS?????.GSI
where CRS?????.GSI is the cross section file name.

Press **NEW (F2)** and follow the instructions in chapter "Creating a Cross Section".

Deleting an Existing Cross Section Template

Panel CROSS SEC\ CRS?????.GSI
where CRS?????.GSI is the cross section file name.

Move the focus bar to the cross section template to be deleted.

DEL (F4)

OK (F5)

The selected cross section template will be deleted.

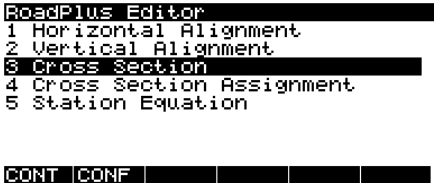
Panel CROSS SEC\ CRS?????.GSI
where CRS?????.GSI is the cross section file name.

The list of the cross section templates is updated.

CONT (F1)

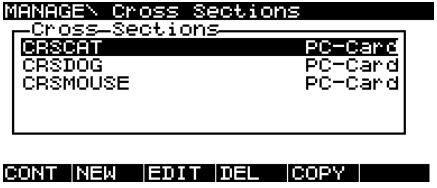
The GSI file for the cross section is updated and stored.

Panel RoadPlus Editor



3 Cross Section

Panel MANAGE\ Cross Sections

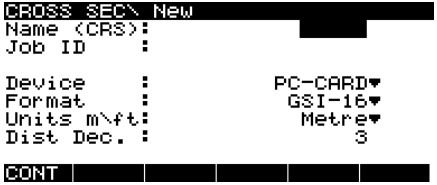


Move the focus bar to the cross section file to be copied.

COPY (F5)

The properties of the original file are used and may be edited.

Panel CROSS SEC\ New



Name <CRS> - Enter a 5 digit name. The system automatically adds CRS as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.

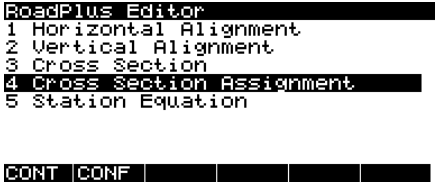
CONT (F1) copies the file and leaves the current panel.

The Cross Section Assignment component of the application program RoadPlus Editor allows the creation, editing and deleting of

- cross section assignments.

A cross section assignment defines from which station on a cross section is to be used.

Panel RoadPlus Editor



4 Cross Section Assignment

This accesses the **panel MANAGE\ X-Sec Assn.** from where cross section assignment files can be created, edited, deleted and copied.

CONT (F1) returns to the **panel RoadPlus Editor**.

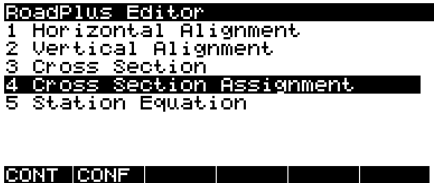
NEW (F2) creates a new cross section assignment file. See chapter "Creating a Cross Section Assignment File".

EDIT (F3) edits a cross section assignment file. See chapter "Editing a Cross Section Assignment File".

DEL (F4) deletes a cross section assignment file.

COPY (F5) copies a cross section assignment file. See chapter "Copying a Cross Section Assignment File".

Panel RoadPlus Editor

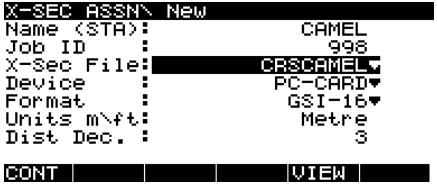


4 Cross Section Assignment

Panel MANAGE\ X-Sec Assn.

NEW (F2)

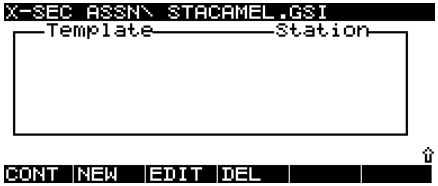
Panel X-SEC ASSN\ New



Name <STA> - Enter a 5 digit name. The system automatically adds STA as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
X-Sec File - From the listbox, select the cross section file containing the cross sections to be assigned. When the focus is on this line, the button **VIEW (F5)** becomes available. This button displays the templates of the selected cross section file. From the display panel, **CONT (F1)** returns to **panel X-SEC ASSN\ New**.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.

CONT (F1)

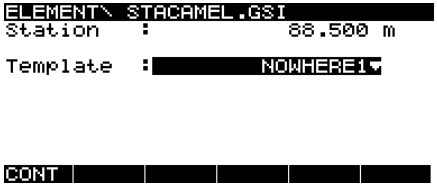
Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



In this panel, all cross section assignments contained in the cross section assignment file are listed. Since no assignment exists yet, the list is empty. The units are as defined for display through the CONFIG key.

Press **NEW (F2)** to create a new assignment.

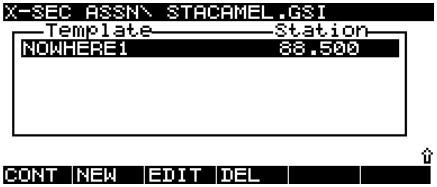
Panel ELEMENT\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



Station - Type in the station from where the cross section element is to be used.
Template - From the listbox, select a cross section template you want to assign to the station.

CONT (F1)

Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



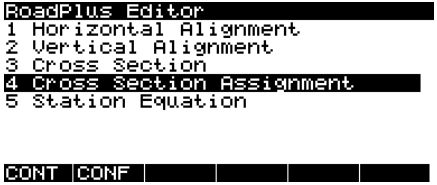
The assignment is added to the list. Assignments are listed with increasing station.

From the list of cross section assignments, an assignment can be highlighted and then edited with **EDIT (F3)** or deleted with **DEL (F4)**. Please refer to chapter "Editing a Cross Section Assignment File" for more information.

CONT (F1)

The GSI file for the cross section assignment is created and stored.

Panel RoadPlus Editor



4 Cross Section Assignment

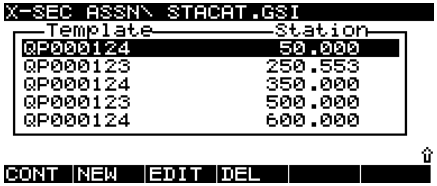
Panel MANAGE\ X-Sec Assn.

Move the focus bar to the cross section assignment file to be edited.

EDIT (F3)

This leads to **panel X-SEC ASSN\ STA?????.GSI**, from where all cross section assignments contained in the cross section assignment file can be edited and deleted or a new assignment can be created.

Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



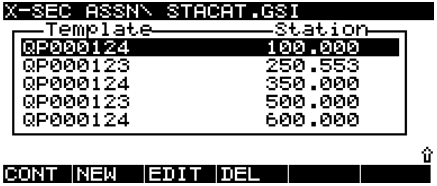
Move the focus bar to the cross section assignment to be edited.

EDIT (F3)

Panel ELEMENT\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.

Either change the station from where the cross section template will be effective or select another template.
CONT (F1)

Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.

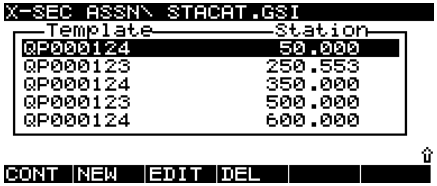


The list of cross section assignments is updated.

To store the changes in the GSI file press **CONT (F1)**.

Inserting a New Cross Section Assignment

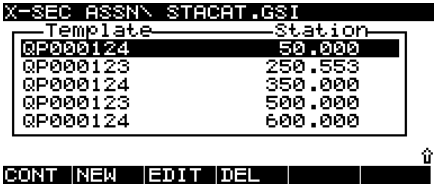
Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



Press **NEW (F2)** and follow the instructions in chapter "Creating a Cross Section Assignment File".

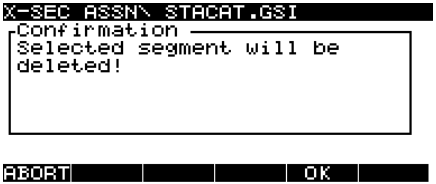
Deleting an Existing Cross Section Assignment

Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.



Move the focus bar to the cross section assignment to be deleted.

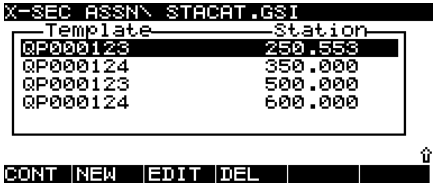
DEL (F4)



OK (F5)

The selected cross section assignment will be deleted.

Panel X-SEC ASSN\ STA?????.GSI
where STA?????.GSI is the name of the cross section assignment file.

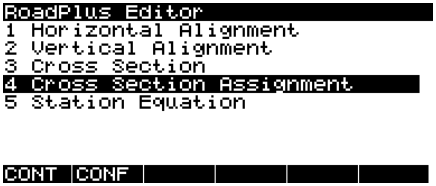


The list of the cross section assignments is updated.

CONT (F1)

The GSI file for the cross section is updated and stored.

Panel RoadPlus Editor



4 Cross Section Assignment

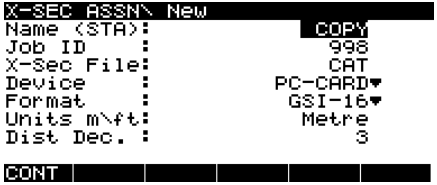
Panel MANAGE\ X-Sec Assn.

Move the focus bar to the cross section assignment file to be copied.

COPY (F5)

The properties of the original file are used and may be edited.

Panel X-SEC ASSN\ New



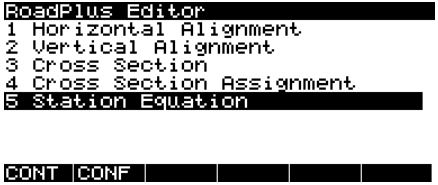
Name <STA> - Enter a 5 digit name. The system automatically adds STA as prefix and the extension gsi.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
X-Sec File - The cross section file selected originally. This cannot be changed.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - Options are **Metre** and **US Feet** as units in which all values will be stored in the GSI file. This can differ from the units configured on the sensor for displaying.
Dist Dec. - Set the number of decimals used for the distance.

CONT (F1) copies the file and leaves the current panel.

The Station Equation component of the application program RoadPlus Editor allows the creation, editing and deleting of the following elements

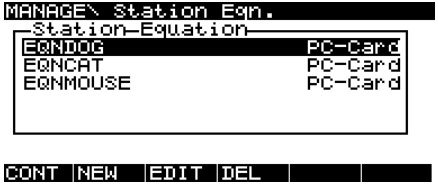
- station ahead
- station back.

Panel RoadPlus Editor



5 Station Equation

This accesses the **panel MANAGE\ Station Eqn.** from where station equation files can be created, edited and deleted.



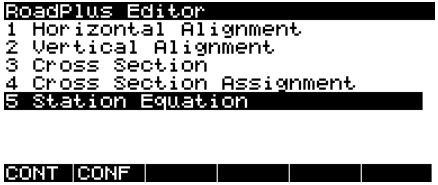
CONT (F1) returns to the **panel RoadPlus Editor**.

NEW (F2) creates a new station equation file. See chapter "Creating a Station Equation".

EDIT (F3) edits a station equation file. See chapter "Editing a Station Equation".

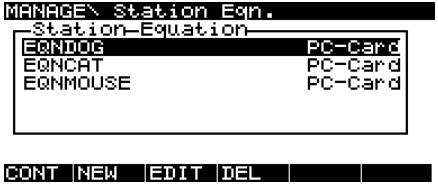
DEL (F4) deletes a station equation file.

Panel RoadPlus Editor



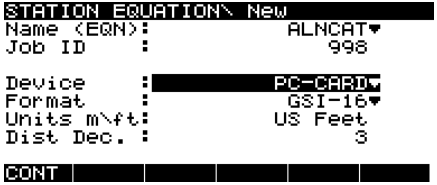
5 Station Equation

Panel MANAGE\ Station Eqn.



NEW (F2)

Panel STATION EQUATION\ New



Name <EQN> - Select the horizontal alignment file to which the new station equation file will belong. The station equation file will automatically be given the same name as the horizontal alignment file but ALN will be replaced by EQN. Example: The horizontal alignment file ALNCAT.GSI will have a station equation file called EQNCAT.GSI.
Job ID - The Job Indentification can be up to 16 ASCII characters long. It is part of the header of the GSI file. This number informs the system about which GSI files belong together.
Device - Sets the device upon which the job is stored. Note that internal memory is not fitted as standard and therefore may not be an option.
Format - Select between **GSI-8** and **GSI-16**.
Units m\ft - The units in which all values will be stored in the GSI file. The information is read from the horizontal alignment file selected and cannot be changed. These units can differ from the units configured on the sensor for displaying.

Dist Dec. - The number of decimals used for the distances is used from the horizontal alignment file selected and cannot be changed.

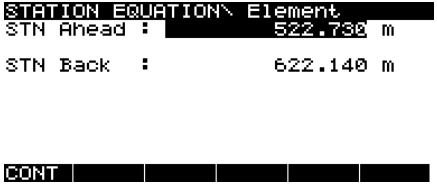
CONT (F1)

Panel STATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.

In this panel, all station equations contained in the station equation file are listed. Since no equation exists yet, the list is empty. The units are as defined for display through the CONFIG key.

Press **NEW (F2)** to create a new equation.

Panel STATION EQUATION\ ELEMENT



STN Ahead - Type in the station ahead.
STN Back - Type in the station back.

CONT (F1)

Panel STATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.

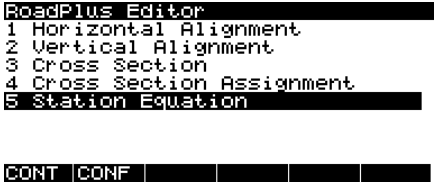
The equation is added to the list. Several equations in the list are listed with increasing station ahead.

From the list of station equations, an equation can be highlighted and then edited with **EDIT (F3)** or deleted with **DEL (F4)**. Please refer to chapter "Editing a Station Equation" for more information.

CONT (F1)

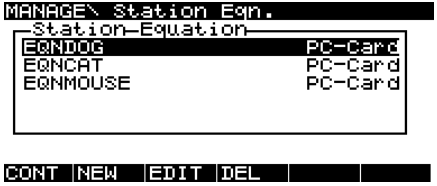
The GSI file for the station equation file is created and stored.

Panel RoadPlus Editor



5 Station Equation

Panel MANAGE\ Station Eqn.

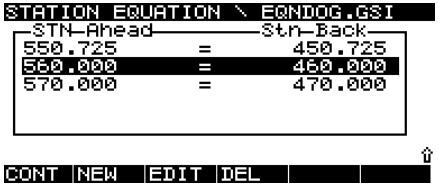


Move the focus bar to the station equation file to be edited.

EDIT (F3)

This leads to **panel STATION EQUATION \ EQN?????.GSI**, from where all station equations contained in the station equation file can be edited and deleted or a new equation can be created.

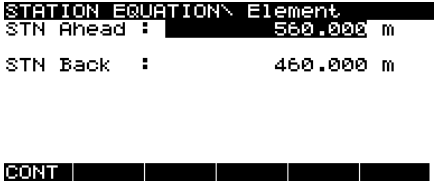
Panel STATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.



Move the focus bar to the station equation to be edited.

EDIT (F3)

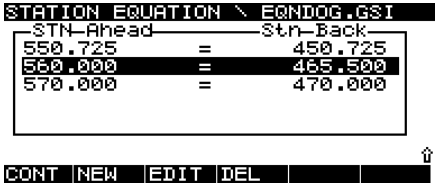
Panel STATION EQUATION\ ELEMENT



Change the station ahead or the station back as required.

CONT (F1)

Panel STATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.

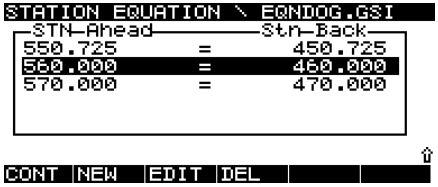


The list of station equations is updated.

To store the changes in the GSI file press **CONT (F1)**.

Inserting a New Station Equation

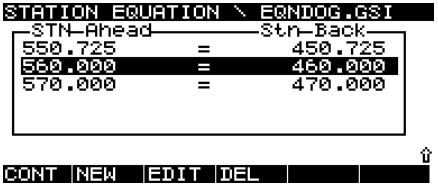
PanelSTATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.



Press **NEW (F2)** and follow the instructions in chapter "Creating a Station Equation".

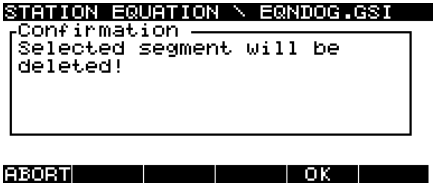
Deleting an Existing Station Equation

PanelSTATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.



Move the focus bar to the station equation to be deleted.

DEL (F4)



OK (F5)

The selected station equation will be deleted.

PanelSTATION EQUATION \ EQN?????.GSI
where EQN?????.GSI is the name of the station equation file.

The list of the station equations is updated.

CONT (F1)

The GSI file for the station equation file is updated and stored.

A

Parameter A of a clothoïde. Defined as $A^2 = R \times L$ (A - parameter, R - radius, L - length of portion of curve).

Alignment

A curvilinear line describing the plan or profile view of a project. Horizontal and Vertical Alignments exist.

Backward Station Equation

See overlap equation

Centre Line

The plan view alignment, also called Horizontal Alignment.

Chainage

The cumultative distance along the horizontal alignment, frequently but not always starting at zero. Also called station.

Clothoïde

A horizontal curve with constantly linear increasing curving. Defined by $A^2 = R \times L$ (A - parameter, R - radius, L - length of portion of curve).

Cross Section

A profile view of a project at a particular station.

Curve

A horizontal curve of constant radius, e.g. a portion of a circle.

Curve In

A portion of a clothoïde. Spiral transition from larger to smaller radius curve ($R_1 > R_2$, parameter A).

Curve Out

A portion of a clothoïde. Spiral transition from smaller to larger radius curve ($R_1 < R_2$, parameter A).

Curvilinear

A line consisting of any combination of tangents, curves and / or spirals for the horizontal or for the vertical of tangents, curves and / or parabolas.

Cut Slope

The surface of the project in areas of excavation with the design surface below original ground.

Design Surface

The intended shape of the completed project.

Equation

Required for a point on the horizontal alignment where the stationing is discontinuous. Gap equations and overlap equations are distinguished.

Fill Slope

The surface of the project in areas of fill with the design surface above original ground.

Finished Road Level

The level to which the final road is build to.

Forward Station Equation

See gap equation

Gap Equation

A type of station equation handling gaps in the stationing after removing a constituing element and stationing has not been re-computed.

Grade

Rate of change in elevation of the vertical alignment.

Ground Surface

See original ground

Horizontal Alignment

The plan view alignment, also called centre line.

Long Profile

The profile alignment, also called vertical alignment.

Offset

The horizontal or vertical distance from a point to an alignment or cross section.

Original Ground

The undisturbed surface before project construction is started as well as the actual shape of the project at the current stage of construction; also called original surface or ground surface.

Original Surface

See original ground

Overlap Equation

A type of station equation handling overlaps in the stationing after inserting a constituing element and stationing has not been re-computed.

P

Parameter P. This is the reciprocal of the rate of change of grade in the vertical curve. Three formulas for the calculation of P exist (see chapter Vertical Alignment).

Parabola

A parabolic arc. Exists only on vertical alignments.

Profile

See cross section

Spiral

A gradual horizontal transition from a tangent to a curve or two curves of different radii; optional for roads, required for railroads.

Spiral In

A gradual horizontal spiral transition from a tangent to a curve ($R_1 = \infty$, $R_2 = n$, parameter A).

Spiral Out

A gradual horizontal spiral transition from a curve to a tangent ($R_1 = n$, $R_2 = \infty$, parameter A).

Station

The cumultative distance along the horizontal alignment, frequently but not always starting at zero. Also called chainage.

Station Ahead

The stationing to be applied going forward along the alignment from the equation.

Station Back

The stationing to be applied going backwards along the alignment from the equation.

Station Equation

It defines adjustments for the Horizontal Alignment File when consituing elements have been added / removed resulting in a gap or overlap in the stationing without re-computing stationing.

Superelevation

Modification of the normal pavement cross slope. Intended to increase comfort and safety at speed.

Tangent

A straight line connecting two position points (XY) or height points (Z). It touches a circle, curve or spiral in one point and is perpendicular to the radius of the circle, curve or spiral in this point.

Vertical Alignment

The profile alignment, also called long profile.

Widening

Increase / decrease of road width with change in number of lanes.

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